

REMARKS

The present invention relates to a dual analyzer comprising a hydrogen-flame photometric analyzer for a thin-layer chromatograph and a hydrogen-flame ionization detector. In another aspect, the present invention relates to a method for analyzing a thin-layer chromatograph using hydrogen-flame photometry and hydrogen-flame ionization, whereby a compound containing a hetero element can be selectively detected.

In the Office Action of July 1, 2004, claim 4-6 were objected to as being improperly multiply dependent. Furthermore, claims 1-2, 7, and 8 were rejected under 35 U.S.C. § 102(b) or alternatively under 35 U.S.C. § 103(a) based on JP 62-100649 (hereinafter JP '649). There were no other rejections.

Applicants have also noted, however, that in the Office Action Summary (Form PTOL-326), no indication was made with respect to the drawings or with respect to Applicants' claim to priority. A telephone communication was made by the undersigned to the Examiner requesting a Supplemental Office Action to address these matters, but so far such has not been received. Therefore, it is again respectfully requested that the Examiner acknowledge Applicants' claim to priority and the sufficiency of the drawings.

Claims 1, 3-5, and 7-8 have been amended herein, including incorporation of subject matter of claims 2 and 6 into claim 1, new claims 9 and 10 have been added directed to preferred embodiments of claim 3, and claims 2 and 6 have been cancelled. The amendments emphasize

the dual analyzer aspect of the present invention, i.e., emphasizing the fact that the analyzer includes (A) a hydrogen-flame photometric analyzer and (B) a hydrogen-flame ionization detector. Furthermore, claim 1 has been amended to further specify the hydrogen-flame photometric analyzer as including (5) a light-guide between the hydrogen flame formed by the hydrogen burner and the spectroscopic means. The amended claim recitation are supported by the disclosure in the specification at, e.g., page 13, lines 3-26, etc. New claims 9 and 10 are supported by the disclosure in the specification at, e.g., page 9, lines 6-14, etc.

It is furthermore noted that the amendments to claims 4 and 5 have placed those claims in appropriate singly dependent form.

In view of these amendments to the claims, as explained further in the following remarks, it is respectfully submitted that all of remaining claims 1, 3-5 and 7-10 are now in condition for immediate allowance.

Regarding the rejections based on JP '649, Applicants note that there are significant differences between the invention described in JP '649 and the present invention. For example, JP '649 discloses a flame analysis method and an apparatus, but does **not** disclose nor suggest the dual analyzer of the present invention which comprises both a hydrogen-flame photometric analyzer and a hydrogen-flame ionization detector. Furthermore, JP '649 does not disclose or suggest that the flame analysis apparatus described therein may comprise a light-guide (see (5) in amended claim 1).

Accordingly, the flame analysis apparatus disclosed in JP '649 is clearly different from the dual analyzer of the present invention, and is lacking with respect to (1) the light-guide, and (2) the hydrogen-flame ionization detector.

As an aside, it is noted in the second paragraph at page 3 of the Office Action, the Examiner indicated an impression that JP '649 does not specifically disclose that the flame used in JP '649 is a hydrogen flame, although the Examiner asserts that it would have been obvious. However, for the Examiner's information, Applicants confirm that JP '649 does mention that hydrogen or hydrogen with argon is preferable as the gas for the flame (see page 2, upper right column, lines 4-3 from the bottom of JP '649).

In further considering the present invention versus the JP '649 reference, it will be seen that the present invention exhibits several advantageous effects vis-à-vis the JP '649 reference.

(i) The advantageous effects of the present invention derived from the light-guide are disclosed on page 11, line 9 from the bottom to page 12, line 18 of the present specification. First, the maintenance and checking becomes convenient in the dual analyzer, without forcefully placing the spectroscopic means and the light-analyzing means around the hydrogen flame where elements are already closely crowded. Secondly, an adverse influence of heat is avoided by separating a heat source (i.e., the hydrogen flame) from the spectroscopic means.

(ii) The advantageous effects of the present invention derived from the hydrogen-flame ionization detector include that components unable to be analyzed by a hydrogen-flame photometric analyzer can nevertheless be analyzed. For example, Fig. 3 of the present application shows that peak 2 (lecithin) was detected by the hydrogen-flame ionization detector (thin curve "a") and the hydrogen-flame photometric analyzer (thick curve "b"), whereas peak 1 (neutral fat) was detected only by the hydrogen-flame ionization detector (thin curve "a"). Further, Fig. 4 of the present application shows that peak 2 (methionine) and peak 4 (homocysteine) were detected by the hydrogen-flame ionization detector (thin curve "a") and the hydrogen-flame photometric analyzer (thick curve "b"), whereas peak 1 (tryptophan) and peak 3 (glutamic acid) were detected only by the hydrogen-flame ionization detector (thin curve "a").

(iii) In the flame analysis method and apparatus disclosed in JP '649, a strip porous paper material is used as a carrier, to analyze one or more elution liquids separated by performing a liquid chromatography. By contrast, the thin-layer chromatography element used in the present invention is composed of a heat-resistant support and a chromatography carrier (see page 10, lines 2-8 of the present specification), using a heat-resistant material such as silicia glass, alumina, or zirconia for the chromatography support.

If a paper material was used as the chromatography support in the present invention, it would not be possible to carry out the desired dual detection, i.e., the analysis of hydrogen-flame ionization and the analysis of hydrogen-flame photometry.

More particularly as to the hydrogen-flame ionization, when a paper material is burned by a hydrogen-flame, many ions are generated in the hydrogen-flame and an excess of current flows into a hydrogen-flame ionization detector.

As to the hydrogen-flame photometry, it is apparent that the burning of organic compounds contained in a sample would decrease the amount of chemiluminescence derived from a phosphorus or sulfur element (i.e., quenching effect), and thus the burning of a paper material also results in a decreased sensitivity.

As described above, the present invention cannot be carried out if a paper material as disclosed in JP '649 would be used as the chromatography support in the present invention. Therefore, Applicants respectfully submit that the present invention is not conceivable from JP '649.

Accordingly, in view of the amendments to the claims and the foregoing comments, it is respectfully submitted that the present invention is clearly unanticipated and non-obvious, and is patentable over the JP '649 reference.

AMENDMENT UNDER 37 C.F.R. § 1.111
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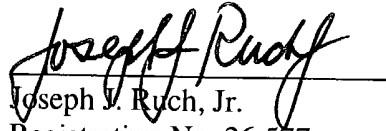
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In view of the above, reconsideration and allowance of pending claims 1, 3-5, and 7-10 of this application are now believed to be in order, and such actions are hereby earnestly solicited.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the local Washington, D.C. telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Joseph V. Ruch, Jr.
Registration No. 26,577

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
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CUSTOMER NUMBER

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